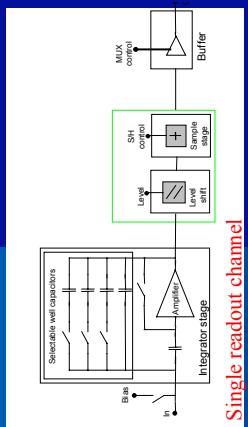


4.2K Multichannel Readout Circuitry in a standard $0.7\mu\text{m}$ CMOS Process for a Photoconductor Array Camera

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Introduction

The cryogenic design and performance of a cold CMOS multichannel readout circuit to be used for the Ge:Ga focal plane detectors in the Photoconductor Array Camera and Spectrometer (PACS) aboard the Herschel Space Observatory is presented. Key issues in the design of this 18 channel readout are noise, bias stability, linearity and low power consumption. As the specification in this project are much tighter than in the ISOPHOT project, a cold readout previously developed at imec (1990), the use of robust architectures and design techniques is essential.



Design

An AC coupled CTIA based readout channel with selectable integrating capacitors is used to meet the required bias control and noise specification at 4.2K. The cascode amplifier has an open loop gain above 2000, to reduce detector debiasing.

In contrast to conventional CTIA architectures, a sample and hold buffer isolates the sensitive input stage from sampling stage. A level shifter is added to multiply the level shift caused by the pmos buffers as to ensure the 2V output dynamic range (see simulations above).

System Performance

The performance of the circuit is verified both by simulations on a commercial circuit simulator and by tests of chips and assemblies at 4.2K.

